FIG. 1

KC

Controller
AP1
Map display application program
KC1
Resolution related information storage means
KC2
Terminal-side symbol image data storage means
KC3
Terminal-side image data identification
information storage means
KC4
Latest symbol image data discrimination means
KC5
Map image creation means
KC5A
Map image rotation control means
KC5B
Map image expansion/reduction control means
KC6
Liquid crystal drive circuit control means
KC7
Search condition input image display means
KC8
Search condition storage means
KC9
GPS control means
KC10
Terminal-side data transmitting means
KC10A
Identification information transmission
request information transmitting means
KC10B
Symbol image data transmission request
information transmitting means
KC10C
Search condition data transmitting means
KC11
Terminal-side data receiving means
KC11A
Server-side image data identification
information receiving means
KC11B
Symbol image data receiving means
KC11C
Map information receiving means
AP2
Call control program

12
Input key

KD1
Liquid crystal
drive circuit

11
Information
display screen

KD2
GPS
drive circuit

GPS

FIG. 2

Place of departure

◉ G P S

○ Phone number   [_____]

○ Address   [_____]

] Input column for
place of departure

Destination

[Tokyo tower]

] Input column for
destination

Date and [_____]/[____]/[_____]
time
       [_____] : [_____]

◉ Departure   ○ Arrival

] Input column for
departure time or
arrival time

Search number

◉ 1 ○ 2 ○ 3

] Input column for
search number

Transportation

◉ Transportation facilities
      + walk

○ Walk

○ Motorcar

] Input column for
transportation

[Start search]   Search starting icon

FIG. 3

```
                                                          SC
┌──────────────────────────────────────────────────────┐
│ Controller                                             │
│                                                   AP3  │
│ ┌────────────────────────────────────────────────────┐│
│ │ Map data delivery application program              ││
│ │                                               SC1  ││
│ │ ┌──────────────────────────────────────────────────┐│
│ │ │ Server-side data receiving means                 ││
│ │ │                                            SC1A  ││
│ │ │ ┌──────────────────────────────────────────────┐ ││
│ │ │ │ Server-side image data identification info   │ ││
│ │ │ │ transmission request information receiving   │ ││
│ │ │ │ means                                        │ ││
│ │ │ │                                       SC1B   │ ││       ┌─────────┐
│ │ │ ┌──────────────────────────────────────────────┐ ││   ◄─── │ Input   │
│ │ │ │ Symbol image data transmission               │ ││       │ device  │
│ │ │ │ request information receiving means          │ ││       └─────────┘
│ │ │ │                                       SC1C   │ ││
│ │ │ ┌──────────────────────────────────────────────┐ ││
│ │ │ │ Search condition data receiving means        │ ││
│ │ │ └──────────────────────────────────────────────┘ ││
│ │ │                                            SC2   ││       ┌─────────┐
│ │ ┌──────────────────────────────────────────────────┐│   ──► │ Display │
│ │ │ Server-side symbol image data updating means     ││       └─────────┘
│ │ │                                            SC2A  ││
│ │ │ ┌──────────────────────────────────────────────┐ ││
│ │ │ │ Server-side symbol image data storage means  │ ││
│ │ │ │                                       SC2B   │ ││
│ │ │ ┌──────────────────────────────────────────────┐ ││
│ │ │ │ Server-side image data identification        │ ││
│ │ │ │ information storage means                     │ ││
│ │ │ └──────────────────────────────────────────────┘ ││
│ │ │                                            SC3   ││
│ │ ┌──────────────────────────────────────────────────┐│
│ │ │ Terminal resolution discrimination means         ││
│ │ │                                            SC4   ││
│ │ ┌──────────────────────────────────────────────────┐│
│ │ │ Map information creation means                   ││
│ │ │ corresponding to search condition                ││
│ │ │                                            SC5   ││
│ │ ┌──────────────────────────────────────────────────┐│
│ │ │ Server-side data transmitting means              ││
│ │ │                                            SC5A  ││
│ │ │ ┌──────────────────────────────────────────────┐ ││
│ │ │ │ Server-side image data identification        │ ││
│ │ │ │ information transmitting means                │ ││
│ │ │ │                                       SC5B   │ ││
│ │ │ ┌──────────────────────────────────────────────┐ ││
│ │ │ │ Symbol image data transmitting means         │ ││
│ │ │ │                                       SC5C   │ ││
│ │ │ ┌──────────────────────────────────────────────┐ ││
│ │ │ │ Map information transmitting means           │ ││
│ │ │ └──────────────────────────────────────────────┘ ││
│ │ └──────────────────────────────────────────────────┘│
│ └────────────────────────────────────────────────────┘│
└──────────────────────────────────────────────────────┘
```

FIG. 4
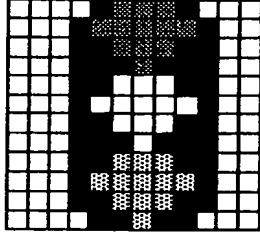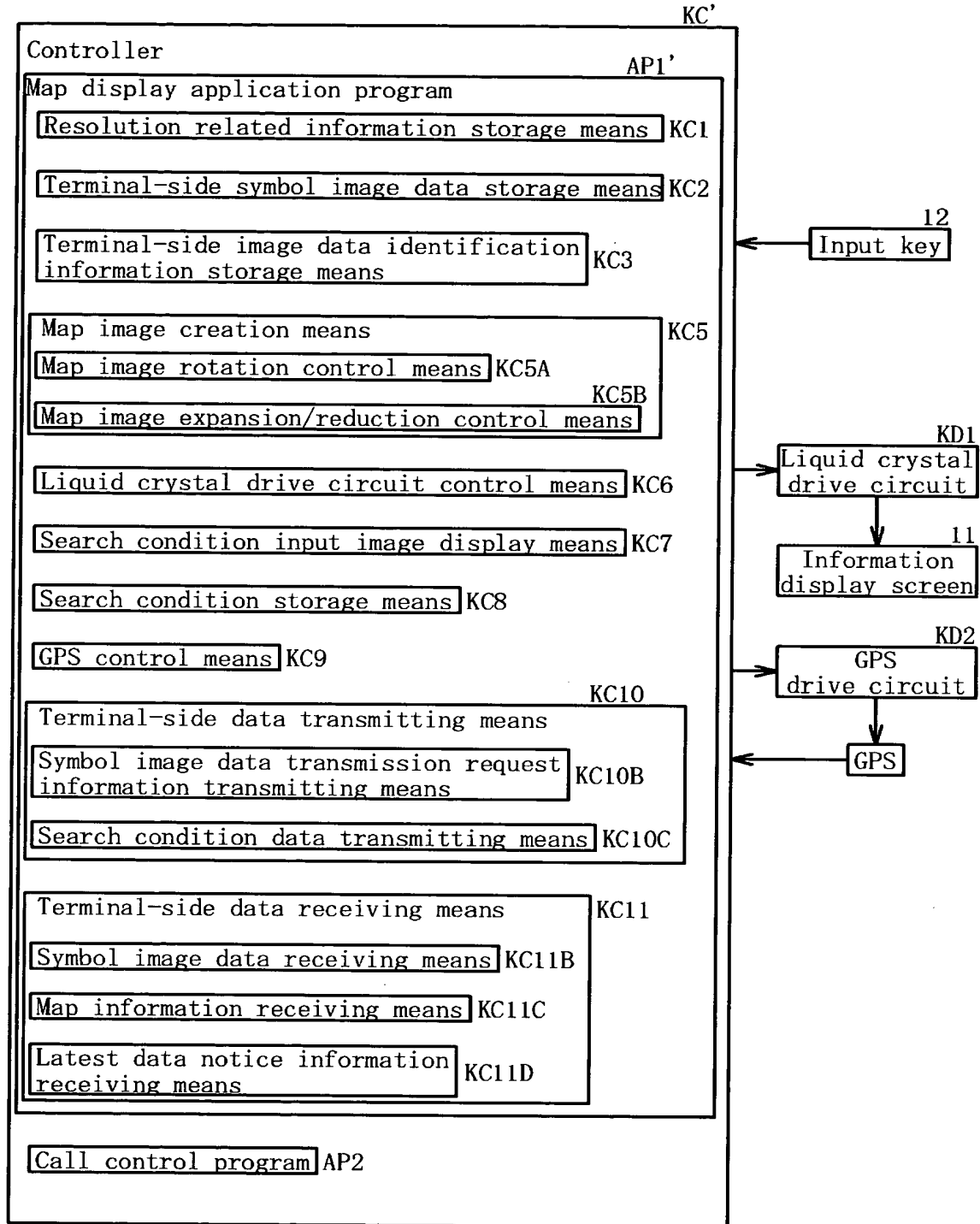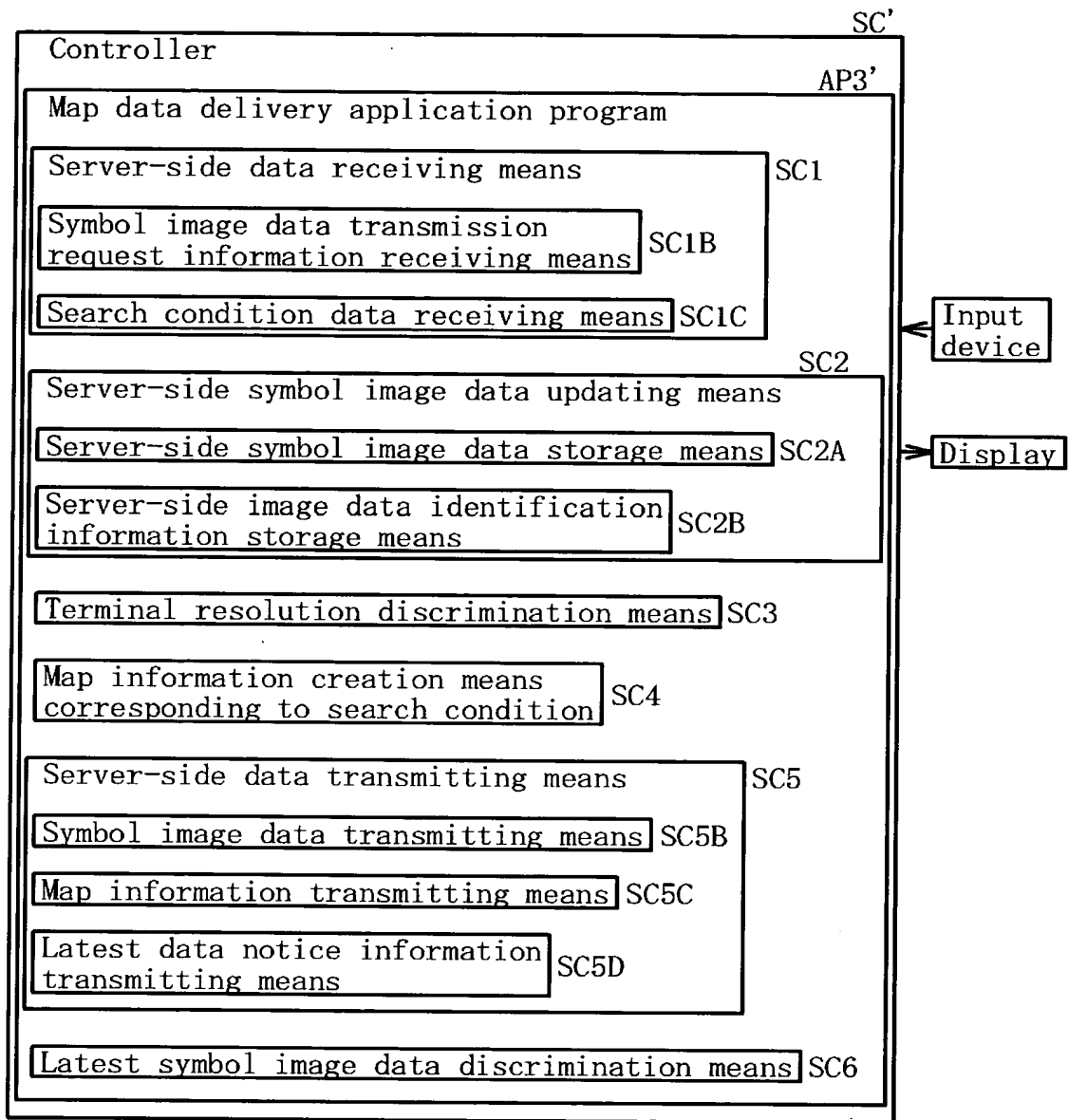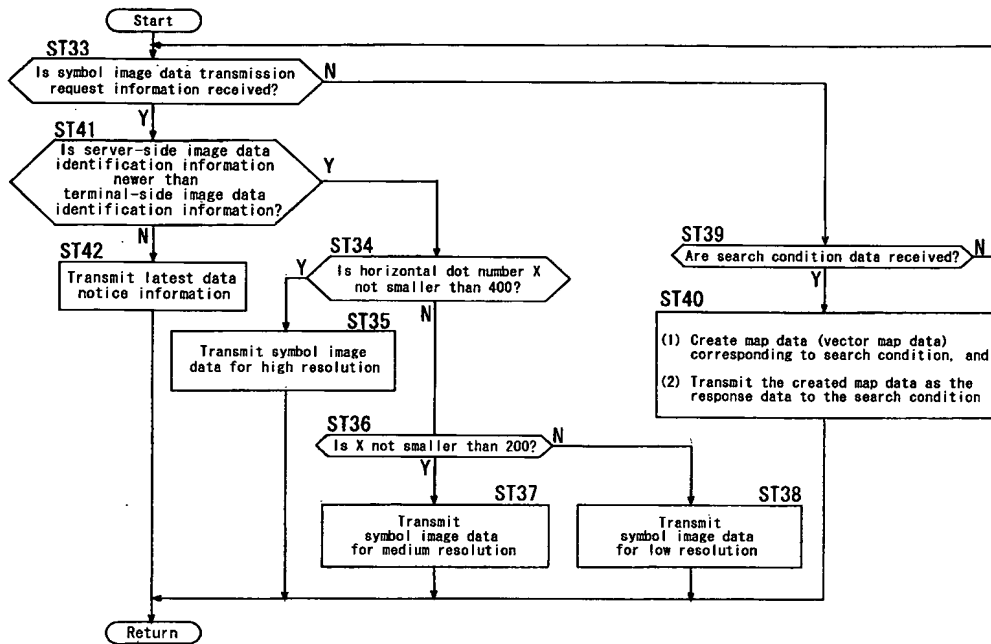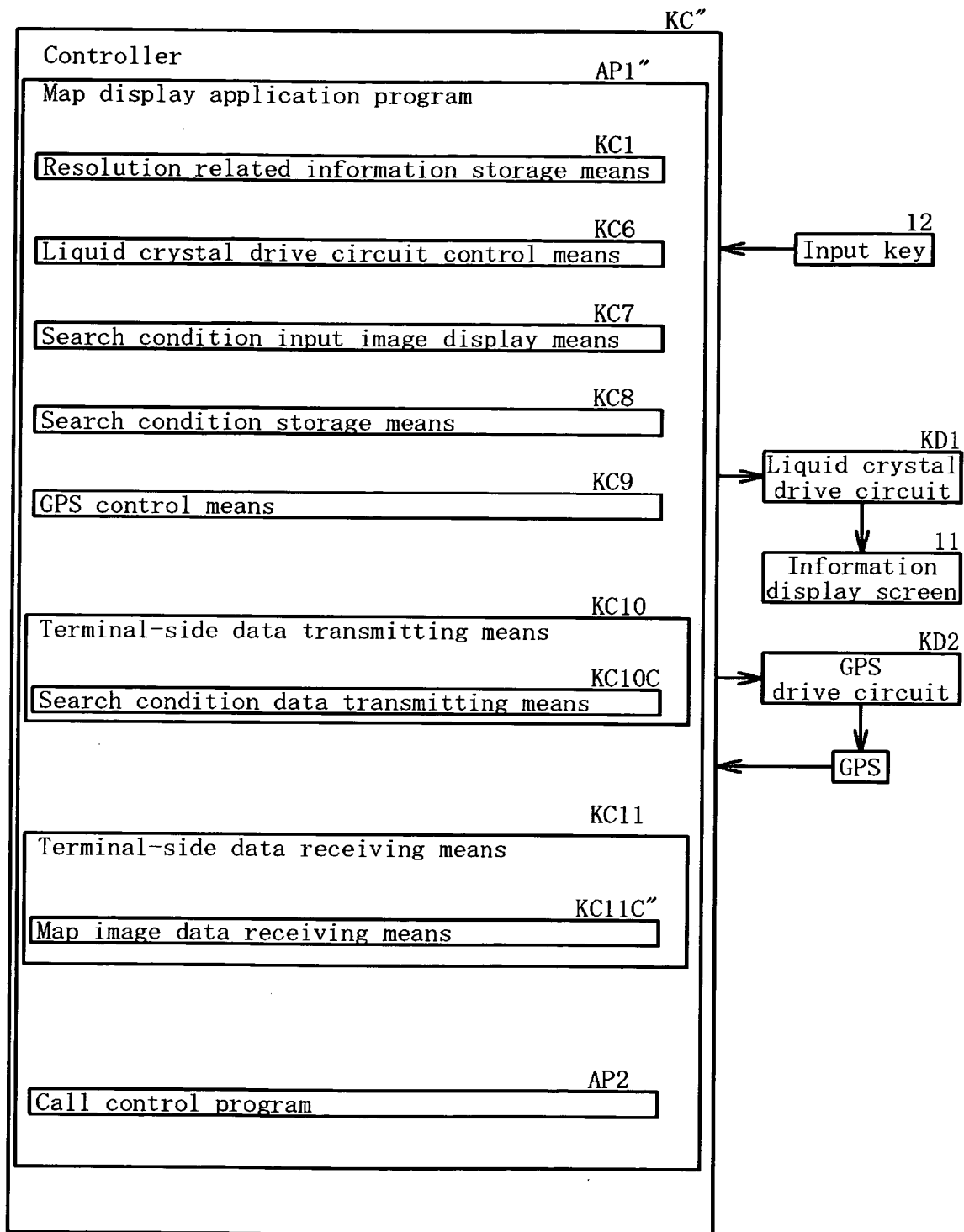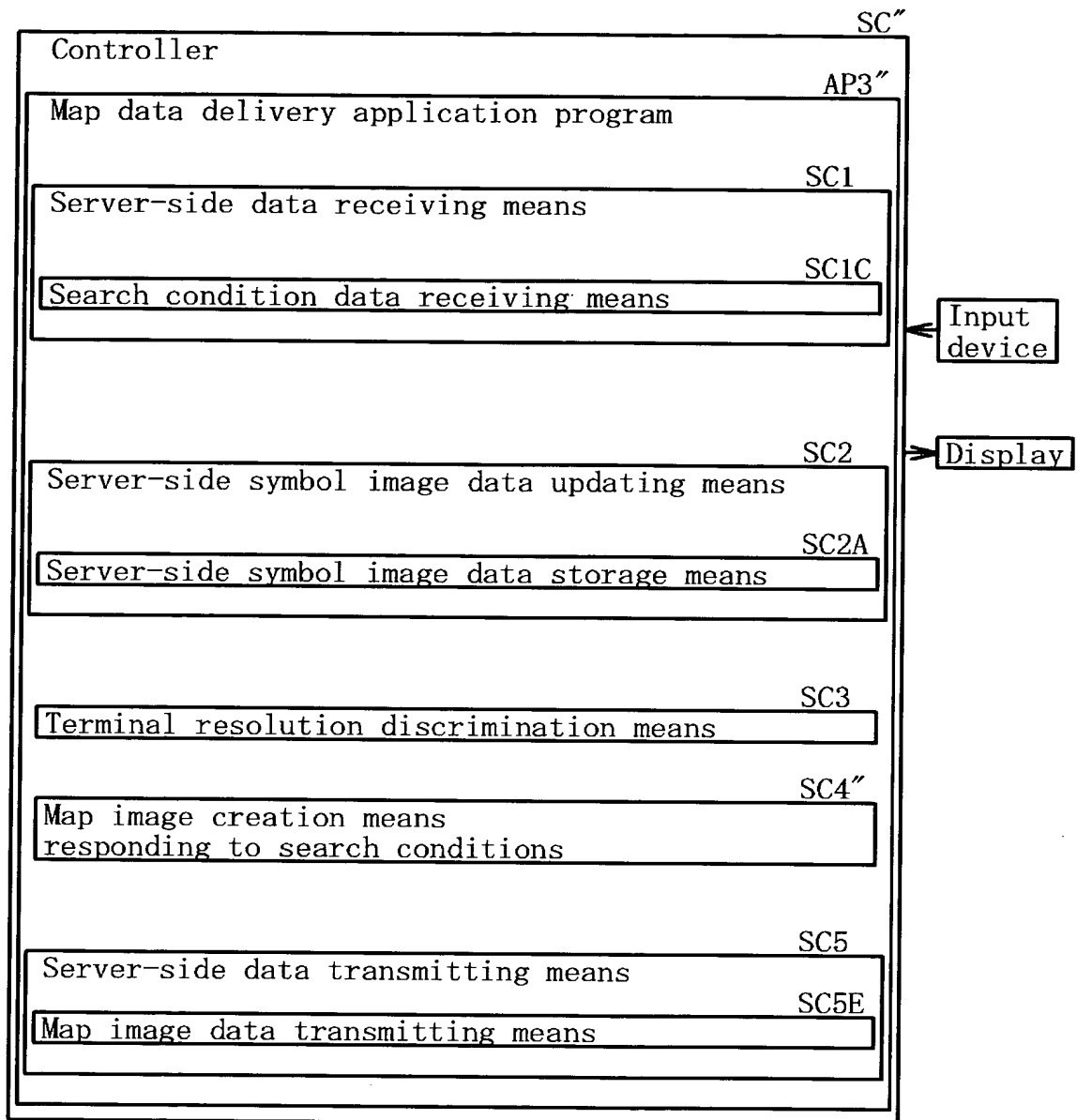
Main flow of map display application program (mobile terminal)

```
                    ( Start )
                        │
  ST1                   ▼
  ◁ Is the map display application program started? ▷──N──┐
                        │Y                                │
  ST2                   ▼                                 │
  ‖ Execute symbol image data transmitting/receiving processing ‖
                        │
  ST3                   ▼◀─────────(A)
  │ Display search condition input image (main screen) │
                        │
  ST4                   ▼
  ◁ Is search condition inputted? ▷──N──┐
                        │Y              │
  ST5                   ▼               │
  │ Transmit search condition data │
                        │
  ST6                   ▼
  ◁ Is the response to search condition data received? ▷──N──┐
                        │Y                                    │
  ST7                   ▼
  │ Create/display a map image on the basis of
    map information and symbol image data │
                        │
  ┌─────────────────────▼──────────────────────────────────────────────┐
  │ ST8                 ▼                                               │
  │  ◁ Is an input to rotate ▷──N──┐                                    │
  │     map image?                 │  ST9                               │
  │        │Y                      ▼                                    │
  │        │           ◁ Is an input to expand/reduce ▷──N──┐           │
  │        │              map image?                        │  ST11     │
  │        │◀──────────────────────────────┘Y              ▼           │
  │        │                                   ◁ Is an input to end ▷──N──┐
  │        │                                      the navigation         │
  │        │                                      software?              │
  │ ST10   ▼                                         │Y        ST12      ▼
  │ │ Re-create and display the map after rotated or │    ◁ Is an input command ▷──N──
  │ │ after expanded/reduced, corresponding to the input │   to re-input search
  │ └────────────────────────────────────────────────┘       condition?
  │        │                                         │              │Y
  └────────┘                                    ( Return )         (A)
```

FIG. 5

Symbol image data transmitting/receiving processing (subroutine at ST2)

```
                    ┌─────────────┐
                    │    Start    │
                    └──────┬──────┘
       ST21               │
            ┌─────────────▼─────────────┐
            │ Transmit identification   │
            │ information transmission  │
            │    request information    │
            └─────────────┬─────────────┘
       ST22               │           ◄──────────────┐
        ◄───────────────────────────────────►  N ────┤
         Is server-side image data identification    │
                  information received?               │
       ST23           Y │                             │
        ◄───────────────▼──────────────────►          │
                 Is server-side                       │
         image data identification information   N ───┼──┐
                   newer than                         │  │
          terminal-side image data                    │  │
          identification information?                 │  │
       ST24          Y │                              │  │
            ┌───────────▼───────────────┐             │  │
            │         Transmit          │             │  │
            │ symbol image data transmission          │  │
            │      request information   │            │  │
            │            and            │             │  │
            │ resolution related information           │  │
            └───────────┬───────────────┘             │  │
       ST25             │        ◄────────────────────┘  │
        ◄───────────────▼──────────────────►  N           │
               Are symbol image data                      │
               completely received?                       │
                      Y │   ◄──────────────────────────────┘
                    ┌───▼──────┐
                    │   End    │
                    └──────────┘
```
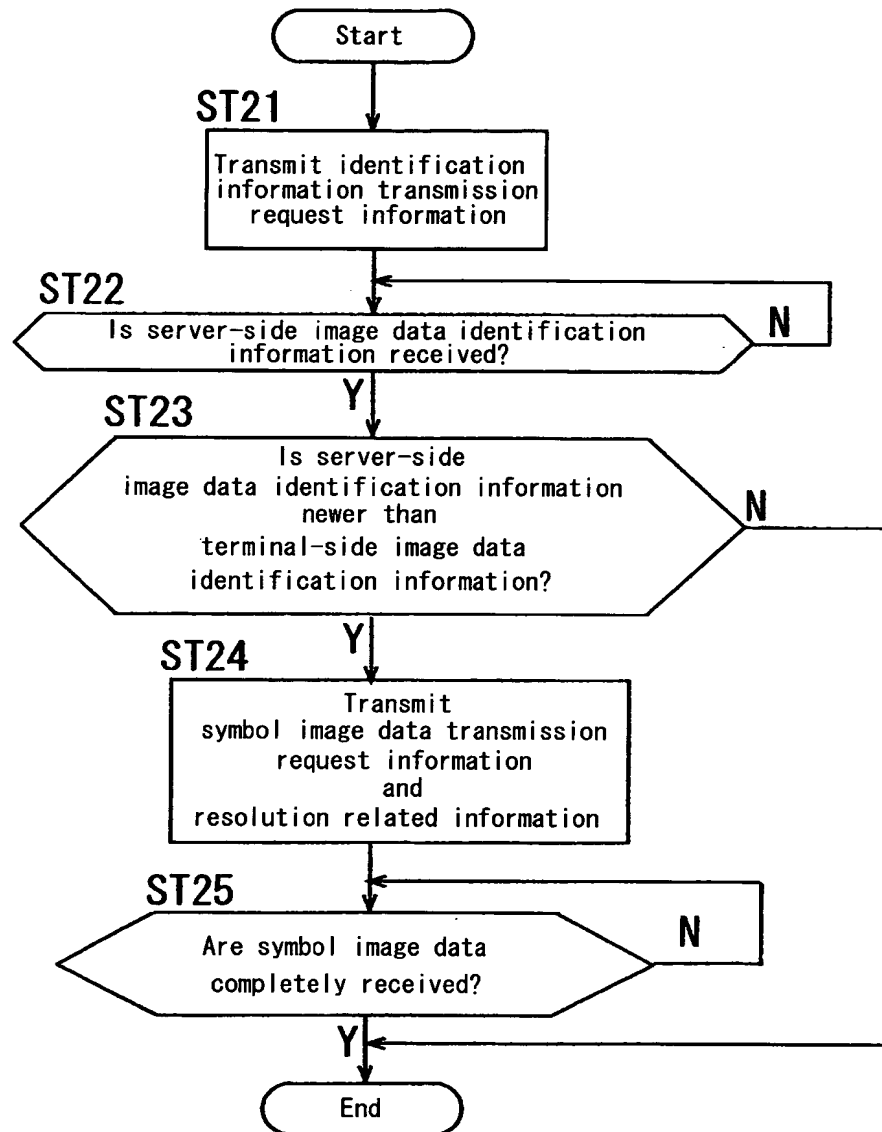
FIG. 6

Main flow of map data delivery application program (server)

```
                        ( Start )
                            │
ST31                        ▼
  ┌──────────────────────────────────┐  N
  │ Is identification information     ├──────────┐
  │ transmission request information  │          │
  │ received?                         │        ST33
  └──────────────────────────────────┘          ▼
            │ Y                        ┌──────────────────────────────┐  N
ST32        ▼                          │ Is symbol image data          ├──────────┐
  ┌──────────────────────────┐         │ transmission request          │          │
  │ Transmit server-side      │        │ information received?         │        ST39
  │ image data                │        └──────────────────────────────┘          ▼
  │ identification information │                  │ Y                  ┌──────────────────────────┐ N
  └──────────────────────────┘        ST34        ▼                   │ Are search condition      ├──┐
            │              Y  ┌────────────────────────────┐          │ data received?            │  │
            │            ┌────┤ Is horizontal dot number X │          └──────────────────────────┘  │
            │            │    │ not smaller than 400?      │                  │ Y                    │
            │         ST35    └────────────────────────────┘        ST40       ▼                     │
            │            ▼              │ N                 ┌──────────────────────────────────────┐  │
            │   ┌──────────────────┐    │                  │ (1) Create map data (vector map data)  │  │
            │   │ Transmit symbol   │   │                  │     corresponding to search condition, │  │
            │   │ image data for    │   │                  │     and                                │  │
            │   │ high resolution   │   │                  │ (2) Transmit the created map data as the│  │
            │   └──────────────────┘    │                  │     response data to the search        │  │
            │            │           ST36│                 │     condition                          │  │
            │            │              ▼                  └──────────────────────────────────────┘  │
            │            │    ┌──────────────────┐  N                                                 │
            │            │    │ Is X not smaller ├──────────┐                                         │
            │            │    │ than 200?        │          │                                         │
            │            │    └──────────────────┘        ST38                                        │
            │            │   ST37  │ Y                       ▼                                         │
            │            │         ▼                ┌──────────────────┐                              │
            │            │   ┌──────────────────┐   │ Transmit          │                             │
            │            │   │ Transmit          │   │ symbol image data │                            │
            │            │   │ symbol image data │   │ for low resolution│                            │
            │            │   │ for medium        │   └──────────────────┘                             │
            │            │   │ resolution        │          │                                         │
            │            │   └──────────────────┘          │                                         │
            │            │         │                        │                                         │
            ▼            ▼         ▼                        ▼                                         │
  ( Return )
```
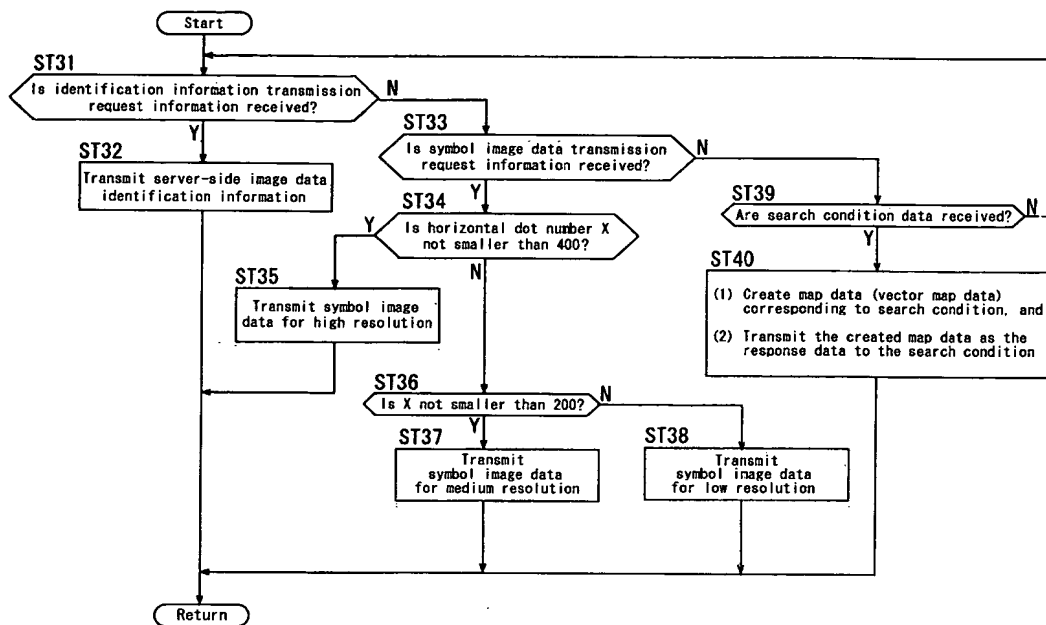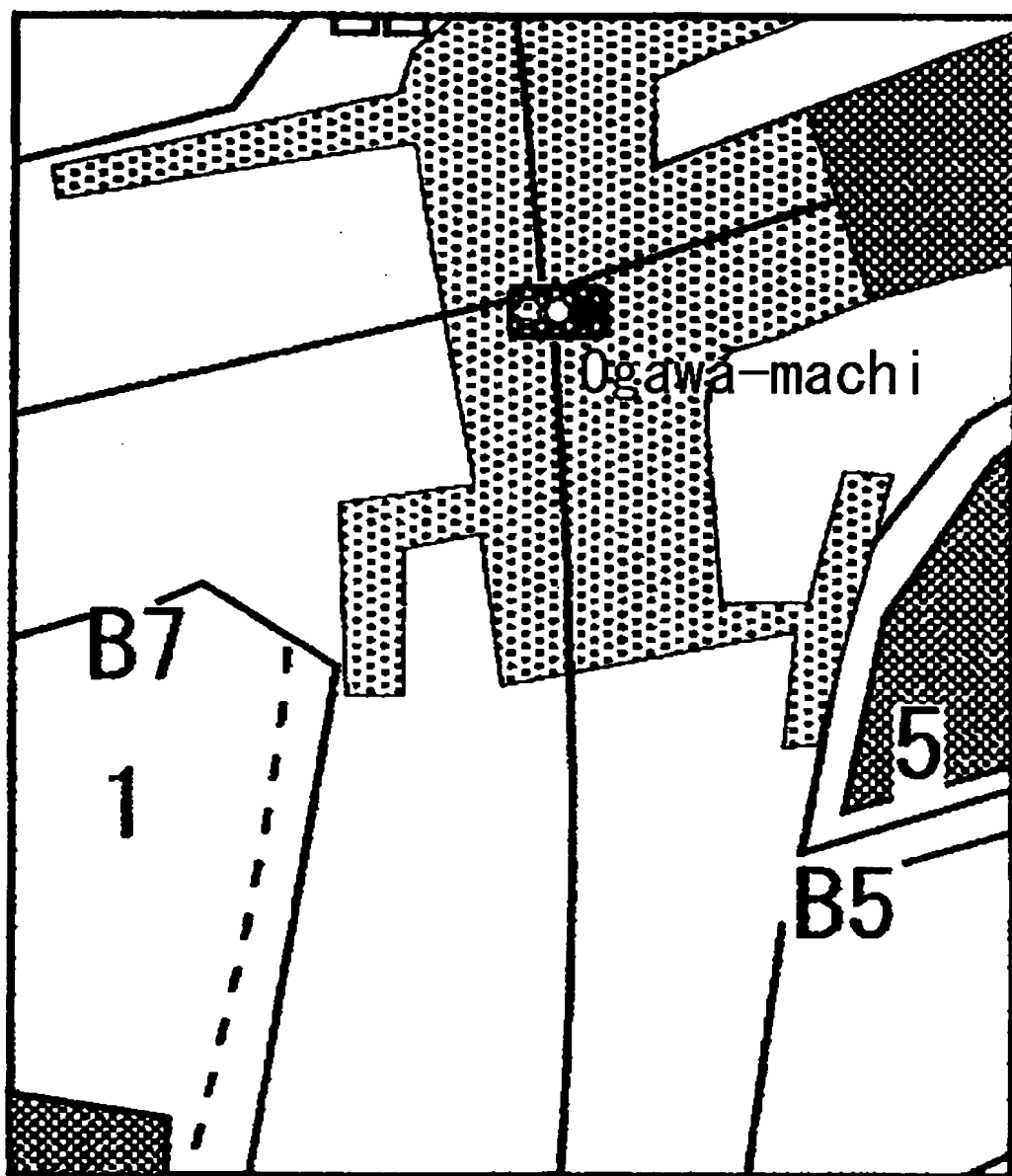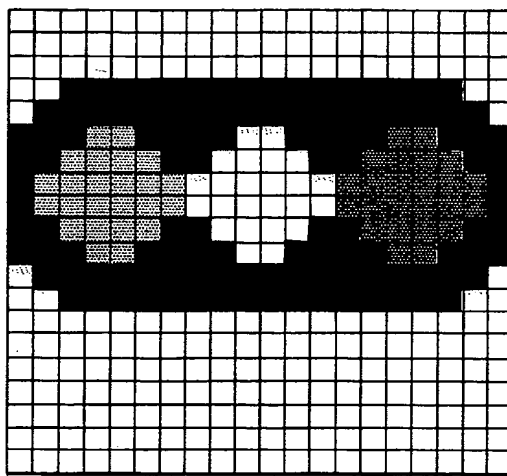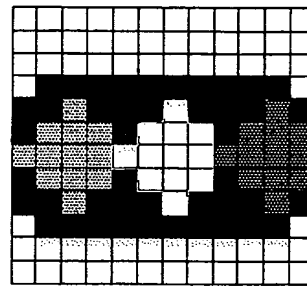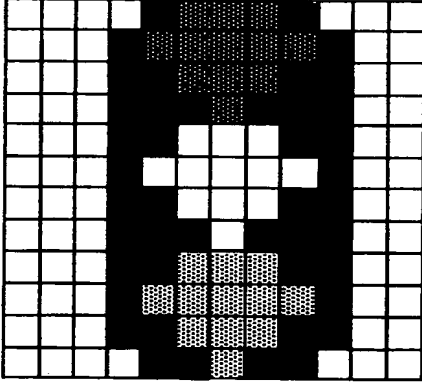
FIG. 7

B7

1

Ogawa-machi

5

B5

FIG. 8

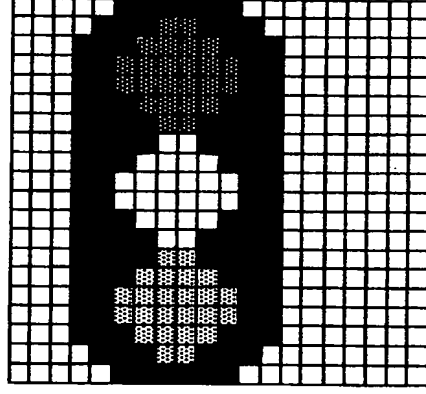(Fig. 9A)

(Fig. 9B)

FIG. 9

(Fig. 10A)

(Fig. 10B)

(Fig. 10C)

FIG. 10

```
KC'
┌──────────────────────────────────────────────────────────┐
│ Controller                                               │
│                                              AP1'        │
│ ┌────────────────────────────────────────────────────┐   │
│ │Map display application program                     │   │
│ │ ┌─────────────────────────────────────────┐        │   │
│ │ │Resolution related information storage means│KC1    │   │
│ │ └─────────────────────────────────────────┘        │   │
│ │ ┌─────────────────────────────────────────┐        │   │
│ │ │Terminal-side symbol image data storage means│KC2  │   │
│ │ └─────────────────────────────────────────┘        │   │
│ │ ┌──────────────────────────────────────┐           │   │
│ │ │Terminal-side image data identification│KC3        │   │
│ │ │information storage means               │           │   │
│ │ └──────────────────────────────────────┘           │   │
│ │ ┌───────────────────────────────────────┐          │   │
│ │ │Map image creation means               │KC5       │   │
│ │ │ ┌──────────────────────────────┐                  │   │
│ │ │ │Map image rotation control means│KC5A            │   │
│ │ │ └──────────────────────────────┘        KC5B      │   │
│ │ │ ┌────────────────────────────────────┐            │   │
│ │ │ │Map image expansion/reduction control means│      │   │
│ │ │ └────────────────────────────────────┘            │   │
│ │ └───────────────────────────────────────┘          │   │
│ │ ┌──────────────────────────────────────┐           │   │
│ │ │Liquid crystal drive circuit control means│KC6     │   │
│ │ └──────────────────────────────────────┘           │   │
│ │ ┌────────────────────────────────────┐             │   │
│ │ │Search condition input image display means│KC7     │   │
│ │ └────────────────────────────────────┘             │   │
│ │ ┌──────────────────────────────┐                   │   │
│ │ │Search condition storage means│KC8                │   │
│ │ └──────────────────────────────┘                   │   │
│ │ ┌─────────────────┐                                │   │
│ │ │GPS control means│KC9                             │   │
│ │ └─────────────────┘                      KC10       │   │
│ │ ┌──────────────────────────────────────┐           │   │
│ │ │Terminal-side data transmitting means │           │   │
│ │ │ ┌──────────────────────────────────┐             │   │
│ │ │ │Symbol image data transmission request│KC10B     │   │
│ │ │ │information transmitting means        │           │   │
│ │ │ └──────────────────────────────────┘             │   │
│ │ │ ┌──────────────────────────────────┐             │   │
│ │ │ │Search condition data transmitting means│KC10C    │   │
│ │ │ └──────────────────────────────────┘             │   │
│ │ └──────────────────────────────────────┘           │   │
│ │ ┌──────────────────────────────────────┐           │   │
│ │ │Terminal-side data receiving means    │KC11        │   │
│ │ │ ┌────────────────────────────────┐               │   │
│ │ │ │Symbol image data receiving means│KC11B           │   │
│ │ │ └────────────────────────────────┘               │   │
│ │ │ ┌──────────────────────────────┐                 │   │
│ │ │ │Map information receiving means│KC11C             │   │
│ │ │ └──────────────────────────────┘                 │   │
│ │ │ ┌────────────────────────────┐                   │   │
│ │ │ │Latest data notice information│KC11D              │   │
│ │ │ │receiving means               │                   │   │
│ │ │ └────────────────────────────┘                   │   │
│ │ └──────────────────────────────────────┘           │   │
│ └────────────────────────────────────────────────────┘   │
│ ┌─────────────────────┐                                  │
│ │Call control program│AP2                               │
│ └─────────────────────┘                                  │
└──────────────────────────────────────────────────────────┘

                                          12
                                    ┌───────────┐
                            ◄───────│Input key  │
                                    └───────────┘

                                          KD1
                                    ┌───────────┐
                            ───────►│Liquid crystal│
                                    │drive circuit │
                                    └───────────┘
                                         │
                                         ▼  11
                                    ┌───────────┐
                                    │Information │
                                    │display screen│
                                    └───────────┘

                                          KD2
                                    ┌───────────┐
                            ───────►│GPS        │
                                    │drive circuit│
                                    └───────────┘
                                         │
                                         ▼
                                    ┌───────┐
                            ◄───────│GPS    │
                                    └───────┘
```

FIG. 11

Controller   SC'

Map data delivery application program   AP3'

Server-side data receiving means   SC1

Symbol image data transmission
request information receiving means   SC1B

Search condition data receiving means   SC1C

                                                                                  SC2
Server-side symbol image data updating means

Server-side symbol image data storage means   SC2A

Server-side image data identification
information storage means   SC2B

Terminal resolution discrimination means   SC3

Map information creation means
corresponding to search condition   SC4

Server-side data transmitting means   SC5

Symbol image data transmitting means   SC5B

Map information transmitting means   SC5C

Latest data notice information
transmitting means   SC5D

Latest symbol image data discrimination means   SC6

Input
device

Display

FIG. 12

Symbol image data transmitting/receiving processing (subroutine at ST2)

```
                        ┌─────────────┐
                        │    Start    │
                        └─────────────┘
  ST24'                        │
       ┌──────────────────────┴──────────────────────┐
       │ Transmit terminal-side image data            │
       │        identification information,           │
       │             symbol image data                │
       │   transmission request information,          │
       │                  and                         │
       │   resolution related information.            │
       └──────────────────────┬──────────────────────┘
  ST25                         │ ◄──────────────────────────────┐
         ╱────────────────────────────────╲                     │
        ╱    Are symbol image data          ╲       N            │
        ╲    completely received?           ╱────────┐           │
         ╲────────────────────────────────╱          │           │
                    │ Y                               │           │
                    │                ST26             │           │
                    │          ╱──────────────────────┴───╲       │
                    │         ╱    Is latest data           ╲  N   │
                    │         ╲   notice information         ╱─────┘
                    │          ╲     received?              ╱
                    │           ╲──────────────────────────╱
                    │                      │ Y
                    │ ◄────────────────────┘
                    ▼
                ┌─────────────┐
                │     End     │
                └─────────────┘
```

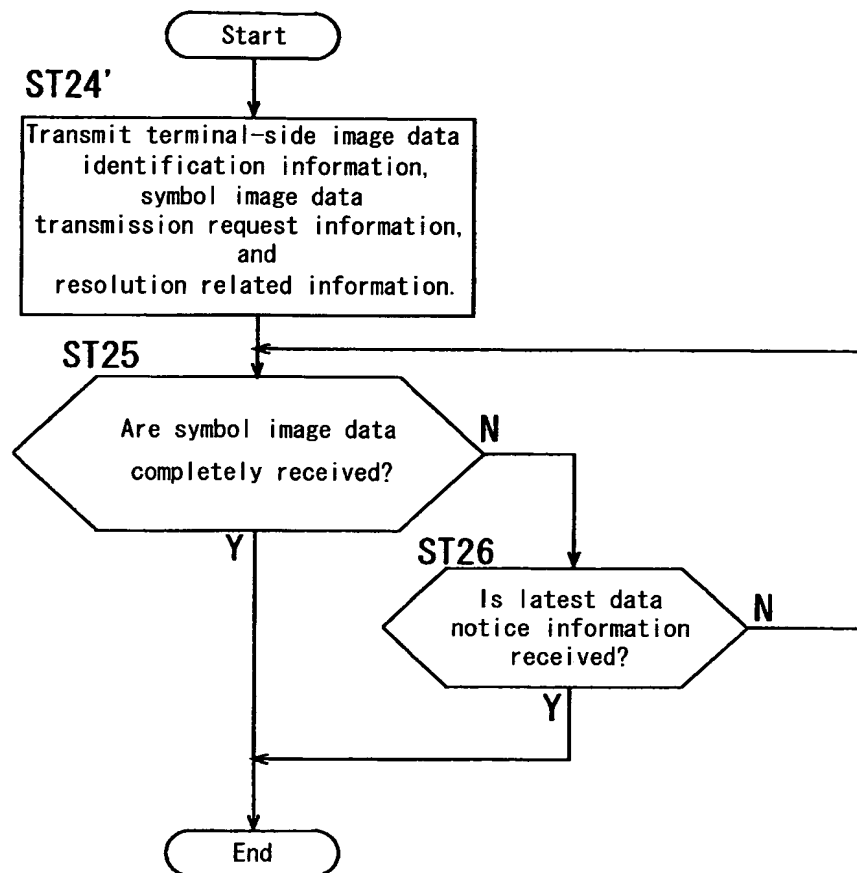FIG. 13

Main flow of map data delivery application program (server)

```
                    ( Start )
        ST33          │
   ┌─────────────────────────────────┐  N
   ⟨ Is symbol image data transmission ⟩──────────────────────────────────────────────┐
   ⟨ request information received?     ⟩                                              │
        ST41        Y │                                                               │
   ┌─────────────────────────────────┐                                               │
   ⟨ Is server-side image data        ⟩                                              │
   ⟨ identification information        ⟩  Y                                           │
   ⟨        newer than                ⟩────────────────┐                             │
   ⟨ terminal-side image data          ⟩               │                             │
   ⟨ identification information?        ⟩               │         ST39              │
        ST42        N │                                 │    ┌──────────────────────────────────┐ N
   ┌──────────────────┐        ST34       │             │    ⟨ Are search condition data received? ⟩──┤
   │ Transmit latest data │  Y ┌──────────────────────┐ │    └──────────────────────────────────┘  │
   │ notice information   │◀───⟨ Is horizontal dot number X ⟩          Y │                            │
   └──────────────────┘     ⟨ not smaller than 400?   ⟩     ST40        │                            │
                    │       └──────────────────────┘    ┌──────────────────────────────────────────┐ │
                    │    ST35          N │               │ (1) Create map data (vector map data)       │ │
                    │  ┌────────────────────┐            │     corresponding to search condition, and  │ │
                    │  │ Transmit symbol image │          │                                            │ │
                    │  │ data for high resolution │        │ (2) Transmit the created map data as the    │ │
                    │  └────────────────────┘            │     response data to the search condition    │ │
                    │                    │               └──────────────────────────────────────────┘ │
                    │    ST36            │                                                            │
                    │  ┌──────────────────────┐ N                                                    │
                    │  ⟨ Is X not smaller than 200? ⟩──────────────┐                                  │
                    │  └──────────────────────┘                   │                                  │
                    │         Y │      ST37                    ST38 │                                 │
                    │  ┌──────────────────┐     ┌──────────────────┐                                │
                    │  │    Transmit       │     │    Transmit       │                               │
                    │  │ symbol image data │     │ symbol image data │                               │
                    │  │ for medium resolution │ │ for low resolution │                              │
                    │  └──────────────────┘     └──────────────────┘                               │
                    │         │        │                │                                            │
   ( Return )◀──────┴─────────┴────────┴────────────────┴────────────────────────────────────────────┘
```

FIG. 14

```
                                                       KC"
┌──────────────────────────────────────────────────┐
│ Controller                                         │
│                                            AP1"    │
│ ┌────────────────────────────────────────────────┐│
│ │ Map display application program                ││
│ │                                         KC1     ││
│ │ ┌────────────────────────────────────────────┐ ││        ┌──────────────┐
│ │ │Resolution related information storage means│ ││        │      12      │
│ │ └────────────────────────────────────────────┘ ││    ┌───│  Input key   │
│ │                                         KC6     ││    │   └──────────────┘
│ │ ┌────────────────────────────────────────────┐ ││◄───┘
│ │ │Liquid crystal drive circuit control means  │ ││
│ │ └────────────────────────────────────────────┘ ││
│ │                                         KC7     ││
│ │ ┌────────────────────────────────────────────┐ ││
│ │ │Search condition input image display means  │ ││
│ │ └────────────────────────────────────────────┘ ││
│ │                                         KC8     ││
│ │ ┌────────────────────────────────────────────┐ ││
│ │ │Search condition storage means              │ ││
│ │ └────────────────────────────────────────────┘ ││        ┌──────────────┐
│ │                                         KC9     ││        │          KD1 │
│ │ ┌────────────────────────────────────────────┐ ││───────►│Liquid crystal│
│ │ │GPS control means                           │ ││        │drive circuit │
│ │ └────────────────────────────────────────────┘ ││        └──────┬───────┘
│ │                                                 ││               ▼
│ │                                         KC10    ││        ┌──────────────┐
│ │ ┌────────────────────────────────────────────┐ ││        │          11  │
│ │ │Terminal-side data transmitting means       │ ││        │Information   │
│ │ │                                   KC10C     │ ││        │display screen│
│ │ │ ┌────────────────────────────────────────┐ │ ││        └──────────────┘
│ │ │ │Search condition data transmitting means│ │ ││        ┌──────────────┐
│ │ │ └────────────────────────────────────────┘ │ ││        │          KD2 │
│ │ └────────────────────────────────────────────┘ ││───────►│     GPS      │
│ │                                                 ││        │ drive circuit│
│ │                                                 ││        └──────┬───────┘
│ │                                         KC11    ││               ▼
│ │ ┌────────────────────────────────────────────┐ ││          ┌────────┐
│ │ │Terminal-side data receiving means          │ ││◄─────────│  GPS   │
│ │ │                                   KC11C"    │ ││          └────────┘
│ │ │ ┌────────────────────────────────────────┐ │ ││
│ │ │ │Map image data receiving means          │ │ ││
│ │ │ └────────────────────────────────────────┘ │ ││
│ │ └────────────────────────────────────────────┘ ││
│ │                                                 ││
│ │                                         AP2     ││
│ │ ┌────────────────────────────────────────────┐ ││
│ │ │Call control program                        │ ││
│ │ └────────────────────────────────────────────┘ ││
│ └────────────────────────────────────────────────┘│
│                                                    │
└────────────────────────────────────────────────────┘
```

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SC''

Controller

AP3''

Map data delivery application program

SC1

Server-side data receiving means

SC1C

Search condition data receiving means

→ Input device

SC2 → Display

Server-side symbol image data updating means

SC2A

Server-side symbol image data storage means

SC3

Terminal resolution discrimination means

SC4''

Map image creation means
responding to search conditions

SC5

Server-side data transmitting means

SC5E

Map image data transmitting means

FIG. 16

Main flow of map display application program (mbile terminal)

```
            ┌───────────┐
            │   Start   │
            └───────────┘
                  │
ST1               ▼  ◄──────────────────────────┐
  ◁ Is the map display application program started? ▷ N ──┘
                  │ Y
ST3               ▼  ◄──────────── Ⓐ
  ┌──────────────────────────────────────────────┐
  │ Display search condition input iamge (main screen) │
  └──────────────────────────────────────────────┘
                  │
ST4               ▼  ◄──────────────┐
     ◁ Is search condition inputted? ▷ N ──┘
                  │ Y
ST5'              ▼
  ┌──────────────────────────────────┐
  │    Transmit search condition data │
  │              and                  │
  │    resolution related information │
  └──────────────────────────────────┘
                  │
ST6               ▼  ◄──────────────────────────┐
  ◁ Is the response to search condition data received? ▷ N ──┘
                  │ Y
                  ▼  ◄──────────────────────────────┐
ST11                                                │
     ◁ Is an input to end                           │
       the navigation software? ▷ N ──┐             │
                  │ Y                  ▼  ST12        │
                  │        ◁ Is an input command ▷ N ─┘
                  │          to re-input
                  │          search condition?
                  │                  │ Y
                  ▼                  ▼
            ┌───────────┐          Ⓐ
            │  Return   │
            └───────────┘
```

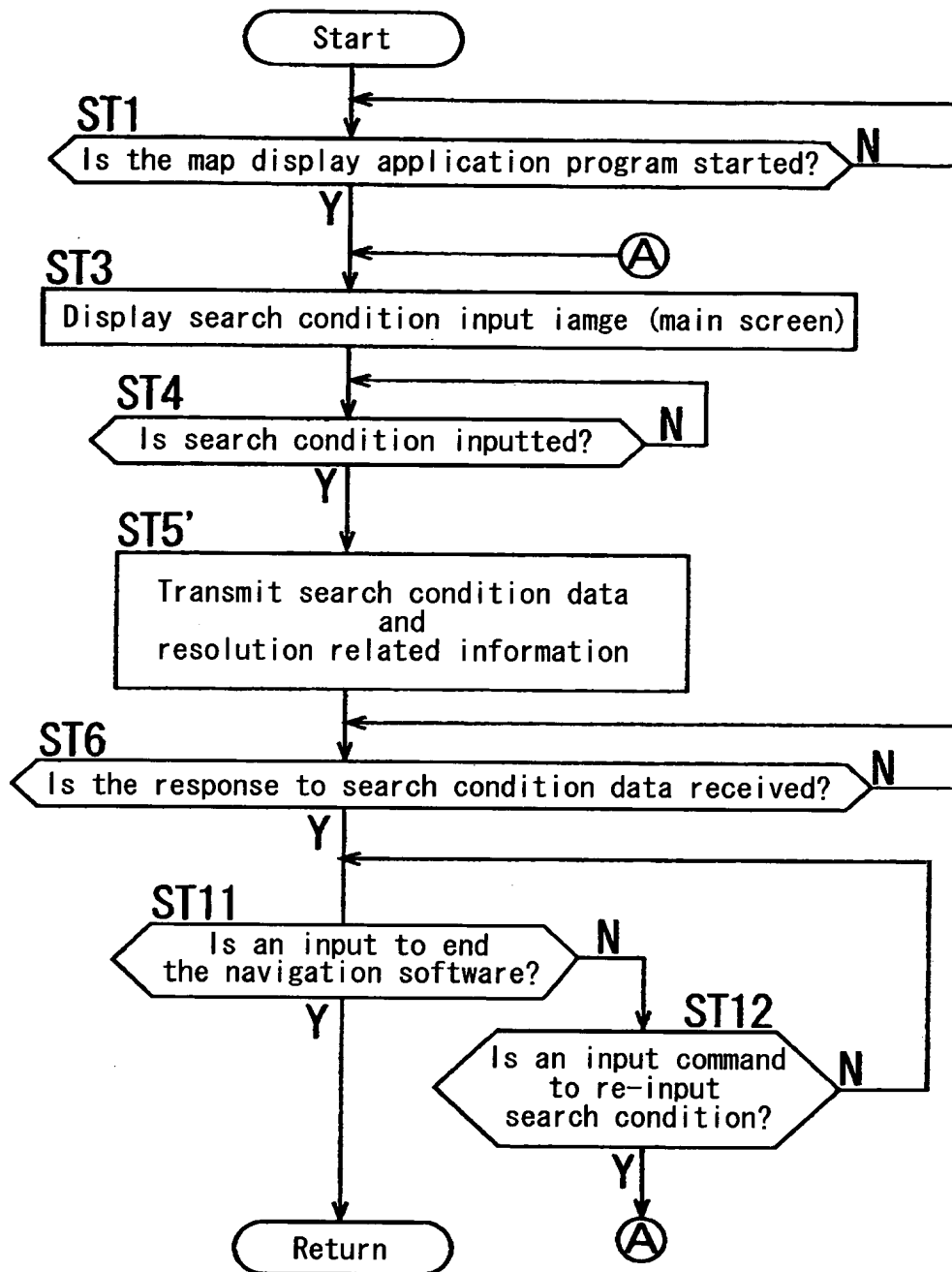F I G. 17

Main flow of map data delivery application program (server)

```
                    ┌─────────┐
                    │  Start  │
                    └─────────┘
                         │
ST51                     ▼                        ┌──┐
  ◁─ Are search condition data received? ─▷───N──┤  │
                         │Y                       └──┘
                         │
ST52                     ▼
  ◁─ Is horizontal dot number X ──────▷──N──┐
      not smaller than 400?                  │
                         │Y        ST54       ▼
                         │          ◁─ Is X not smaller than 200? ─▷──N──┐
                         │                    │Y                          │
ST53                     ▼        ST55         ▼              ST56         ▼
 ┌──────────────────────┐ ┌──────────────────────┐ ┌──────────────────────┐
 │   Set symbol image data│ │   Set symbol image data│ │   Set symbol image data│
 │used in creating map images│ │used in creating map images│ │used in creating map images│
 │     to high resolution │ │   to medium resolution │ │     to low resolution  │
 │     symbol image data  │ │     symbol image data  │ │     symbol image data  │
 └──────────────────────┘ └──────────────────────┘ └──────────────────────┘
            │                        │                        │
            ▼                        │                        │
ST57                                 │                        │
 ┌────────────────────────────────────────────────┐
 │ (1) Create map images corresponding to          │
 │     search conditions,                          │
 │     using set symbol image data, and            │
 │                                                 │
 │ (2) Transmit created map image data             │
 │     as response data                            │
 │     to search conditions                        │
 └────────────────────────────────────────────────┘
                         │
                         ▼
                    ┌─────────┐
                    │  Return │
                    └─────────┘
```

FIG. 18